

Summary of Significant Findings of the PL 480

Project 01-062-1 "Physiological Role of Bacterial Ribonucleases"

RNases I and III of Salmonella typhimurium have been purified to homogeneous states and RNase II has been extensively purified. Using the different affinities of the RNases for ribosomes, a single step procedure for separation of RNases I, II and III has been developed. A method for preparation of ribosomes without ultracentrifugation has also been developed. RNase I minus mutant of S. typhimurium has been isolated by nitrosoguanidine treatment.

RNase I specifically associates with 30s ribosomal subunit (3 molecules of enzyme per 30s subunit). Mg^{2+} dependent inhibition of RNase I by 30s and 70s ribosomes is lost by differential salt treatments of 70s ribosomes and restored by reconstitution of ribosomal particles with detached proteins. Unlike 70s ribosomes and 30s subunits, 50s subunits of Escherichia coli and S. typhimurium are attacked by RNase I whereas Lactobacillus plantarum ribosomes (even 70s) are attacked by the enzyme. The importance of ribosomal configuration is emphasized by the observation that Streptomycin protects E. coli 70s ribosomes and 30s subunits against the attack of RNase I at low Mg^{2+} concentrations.